

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 3, 2015/2016

### TOP2121 – OBJECT-ORIENTED PROGRAMMING

( All sections / Groups )

30 MAY 2016  
09:00AM – 11:00AM  
(2 Hours)

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#### INSTRUCTIONS TO STUDENTS

1. This question paper consists of 8 pages excluding the cover page.
2. Attempt FOUR out of FIVE questions. If you answered all five questions, only the first four questions will be marked.
3. All questions carry equal marks and the distribution of the marks for each question is given.
4. Please write your answers in the Answer Booklet provided.

**QUESTION 1 (10 MARKS)**

a) Compare *procedural language* and *object-oriented language*. (3 marks)

b) Given the definition for class Student below:

```
public class Student {  
    private int id;  
    private String name;  
  
    public void display() {  
        System.out.println("The student is " + name);  
    }  
}
```

- i) Create constructor for the class that initializes all its instance variables.
- ii) Create an object for class Student that supplies value to all its instance variables.
- iii) Call the display method by using object you created in (ii).

(3 marks)

**Continued.....**

- c) There are five key relationships between classes in a UML class diagram, such as dependency, aggregation, composition, inheritance and realization. **Draw and express** the most appropriate relationship between each pair of classes and draw the connections between them using the corresponding UML symbol.

(4 marks)

i) 

```
public class A {  
    public void doSomething(B b) {  
        ...  
    }  
}
```

ii) 

```
public class A {  
    ...  
}  
public class B extends A {  
    ...  
}
```

iii) 

```
public interface A {  
    ...  
}  
public class B implements A {  
    ...  
}
```

iv) 

```
public class B {  
    ...  
}  
public class A {  
    private B _b;  
    public void setB (B b) { _b = b; }  
    ...  
}
```

Continued.....

**QUESTION 2 (10 MARKS)**

a) Briefly explain any TWO of the four principals of an object model.

(2 marks)

b) Write the output of the following codes.

(3 marks)

```
class Polygon{
    Polygon(){
        System.out.println("I'm an Polygon.");
    }
}

class Rectangle extends Polygon{
    Rectangle(){
        System.out.println("I'm a Rectangle.");
    }
}

public class TestRectangle{
    public static void main(String[] args) {
        Polygon a = new Polygon();
        Rectangle c = new Rectangle() ;
    }
}
```

c) Using UML notation, draw a **class diagram** that depicts the relationships (association, aggregation, generalization) between the **classes** in the following scenario.

- In a university there are different classrooms, offices and departments. A department has a name and it contains many offices.
- A person working at the university has a unique ID and can be a professor or an employee.
- A professor can be a full, associate or assistant professor and he/she is enrolled in one department.
- Offices and classrooms have a number ID, and a classroom has a number of seats.
- Every employee works in an office.

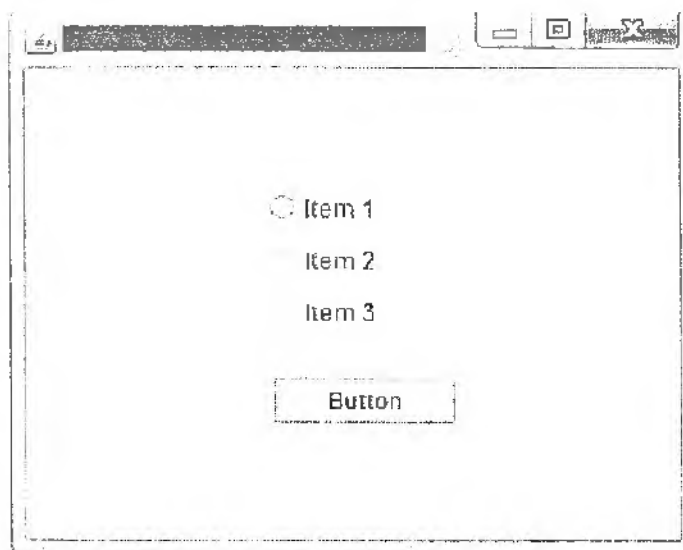
(5 marks)

**Continued.....**

**QUESTION 3 (10 MARKS)**

- a) Define an interface class that contains two *int* constants,  $X = 5$  and  $Y = 10$  and one *int* method called *useXY* which receives no parameters. Call the interface class *XYClass*. (2 marks)
- b) List any TWO tasks that are usually done in the object-oriented analysis phase. (2 marks)

Use the following sample of Graphics User Interface (GUI) for questions c) and d):



- c) Create a **checkboxGroup** that consists of **THREE** radio buttons as shown in the above GUI. (2 marks)
- d) Write Java code for the following purposes:
- i) Create a button as shown in the above GUI.
  - ii) Change the background color of button to red.
  - iii) When the button is clicked, the background color of button will change to blue.
- (4 marks)

**Continued.....**

**QUESTION 4 (10 MARKS)**

- a) Compare procedure model and object model in solving a task.

(1 mark)

- b) Tick the correct scope for each of the access modifier.

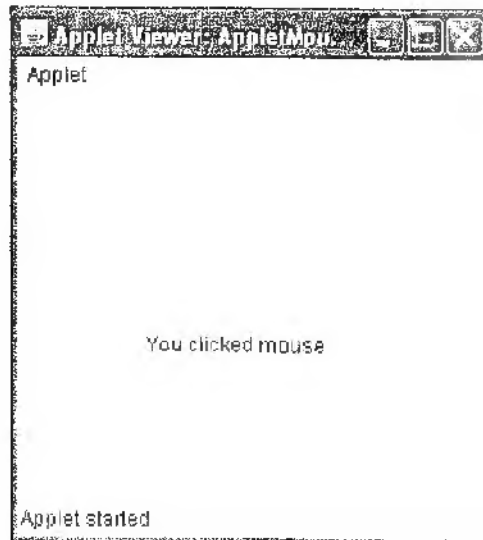
(5 marks)

Access modifier / Scope	Same class	Same package	Subclasses	Different package classes
private				
default				
protected				
public				

**Continued.....**

- c) Given a sample Java applet that demonstrates a GUI displaying the message "You clicked mouse" when the even handler `mouseClicked` is activated. Override the `mouseClicked` and `paint` functions to draw an oval shape (width: 20 and height: 50) at the position of mouse clicked.

(4 marks)



```
import java.applet.Applet;
import java.awt.*;
import java.awt.event.*;

public class AppletMouseListener extends Applet implements
MouseListener
{
    String str="";
    public void init()
    {
        addMouseListener(this);
    }

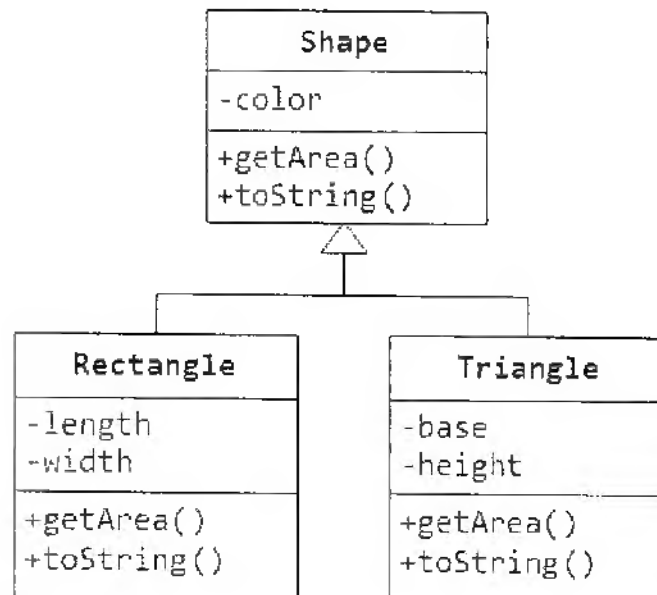
    public void mouseClicked(MouseEvent e)
    {
        str = "You clicked mouse";
        repaint();
    }

    public void paint(Graphics g)
    {
        g.drawString(str, 75, 150);
    }
}
```

Continued.....

**QUESTION 5 (10 MARKS)**

- a) List four tasks that are usually done in the object-oriented design phase. (4 marks)
- b) Consider the UML diagram regarding the inheritance relationship between three classes: shape, rectangle and triangle. Refer to the following Java code line 7 to 9, the functions `getArea` is executed from which class? Explain. (3 marks)



```
1. public class TestShape {
2.     public static void main(String[] args) {
3.         Shape s1, s2;
4.         s1 = new Rectangle();
5.         s2 = new Shape();
6.         Triangle s3 = new Shape();
7.         System.out.println("Area is " + s1.getArea());
8.         System.out.println("Area is " + s2.getArea());
9.         System.out.println("Area is " + s3.getArea());
10.
11. }
```

Continued.....



c) Refer to the below sample Java class.

```
class Example {  
    public static void main(String args[])  
    {  
        int num1=10;  
        int num2=0;  
        int res=num1/num2;  
        System.out.println(res);  
    }  
}
```

- i) If you compile this sample class, what would be the result?
- ii) Unchecked Exception will occur during execution. Why? Explain clearly.

(1 + 2 marks)

**End of Page**